

MCDC

REPORT

WORLD SUPPORT BASE: SPAIN

by
MR. ROBERT FABRIE
SEPTEMBER 1987

MOBILIZATION CONCEPTS DEVELOPMENT CENTER
INSTITUTE FOR NATIONAL STRATEGIC STUDIES



NATIONAL DEFENSE UNIVERSITY
FORT LESLEY J. McNAIR
WASHINGTON, DC 20319-6000

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IDEAS System
National Defense University
Ft. Lesley J. McNair
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The Mobilization Concepts Development Center (MCDC) is engaged in a multi-year study of potential off-shore materiel, service, logistic, and maintenance support for U.S. and Allied military forces. The study, designed to develop a World Support Data Base, entails the examination of foreign defense producers and suppliers to include analysis of their capability to augment defense production and to resupply and maintain U.S. operational forces. The study intends to develop data bases of off-shore defense industries, defense products and services available, and foreign maintenance and overhaul capabilities. MCDC is using existing government and private data bases, open literature such as catalogs, defense journals and information services, and trip reports to develop the World Support Base information base. More importantly, the study will examine problems related to the use of these capabilities and develop concepts for integrating these off-shore capabilities most effectively into U.S. plans and operations.

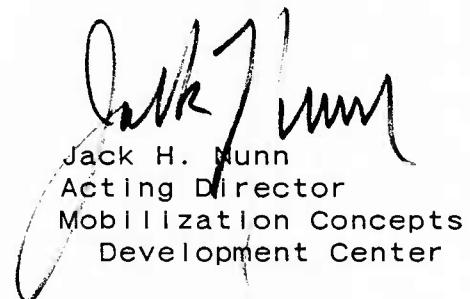
The products of this study will be easily understood and usable data bases on foreign defense production capabilities that may be used to:

1. Identify alternate existing or emerging sources to augment and expand the production of critical defense materiel, provide logistic and maintenance support for U.S. and Allied operational forces.
2. Identify where the U.S. may support multinational development and production programs with Allied producers to promote rationalization, standardization, and integration (RSI) initiatives, improve industrial capabilities, develop alternate sources and take advantage of unique Allied design and industrial capabilities.

This data base is ultimately intended for use by military logistic planners and personnel involved in the acquisition of defense materiel in support of U.S. and Allied operational forces. Thus, it is also important to develop procedures to examine overseas sources and identify information sources for the maintenance and updating of the data base.

This report, one of a series of study efforts underway in the development of a World Support Data Base, was produced by the MCDC sponsored World Support Base Research Seminar conducted at the Industrial College of the Armed Forces (ICAF). Mr. Bob Fabrie of MCDC headed the research effort. Other contributors were LTC Tracy Sheer, LTC Larry Taylor, and Mr. Bruce Waldschmidt.

Spain is important because it possesses manufacturing facilities for practically all of its armed forces requirements and has made impressive gains in recent years in the development of an autonomous production capability. Large investments have been made to modernize these facilities and to boost Spain's capacity not only for its own defense needs but also to compete in world export markets.



Jack H. Nunn
Acting Director
Mobilization Concepts
Development Center

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World Support Base: Spain

BACKGROUND

The attempts of Spain's newly elected government to fulfill promises, made prior to the 1982 election, to create more jobs and restructure the military corps have had a profound effect on the defense industrial sector. Mr. Narcis Serra, Spain's Minister of Defense, told the parliamentary Committee of Plans to reduce land forces by as much as 30% of the active army personnel, unify the services, and restructure the military corps. To achieve these goals, the Spanish army is undergoing a reorganization called META (Modernizacion del Ejercito de Tierra) aimed at reducing manpower. The reduction of personnel will be countered by increasing the efficiency of Spain's armed forces through the acquisition of new and more capable equipment.

The modernization of Spain's armed forces has been taken a step further by the Spanish Ministry of Defense, now taking an active role in reshaping the defense industry. It plans to increase the number of workers in the defense industry by as much as 70% by 1990. Instead of buying off-the-shelf equipment from other industrial nations, the Ministry of Defense will make the commitment to enter into purchase agreements with foreign producers that will provide Spanish industry with some part of the production and technological capability. Also, through government support and commitments, the Ministry will encourage Spanish industry to invest in technological capability, plant modernization and capacity to compete in the world's export market. The aim of the government is to ensure not only that it has a sufficient autonomous production capability to meet the needs of its armed forces but also to consolidate it into a modern and efficient tool for the country's defense.

SPAIN'S DEFENSE INDUSTRY PROGRAM

In an effort to become self sufficient in the production of arms for its own requirements and for export, Spain has supported its industry in two ways. First, it provides direct government support, either in the form of grants or commitments to purchase Spanish defense products. Spain's defense budget has increased as a percent of the gross national product (GNP) from approximately 1.8% in the late 1970's to approximately 2.4% of GNP in 1984 and 1985. Moreover, on average, about 50% of the Spanish defense budget is devoted to the acquisition of material compared with an average of 21% to 28% for most NATO budgets. Second, through offsets in the form of licensed production and multinational collaborative development and production efforts, there has been a significant technology transfer to Spanish industry for a wide range of products. As an example, the sale of F-18's to Spain not only involved financial assistance from the U.S. Government, but also considerable offset concessions. These agreements include Spanish overhaul and damage repair of U.S. Navy F-18s in the

Mediterranean, if the need arises, as well as production of some of the avionics and structural parts for the aircraft. Also, the construction of a factory to build jet engines and a license for the construction of GE's F404 engine for the F-18 has further enhanced Spain's defense industry.

The goal of the Spanish defense industrial program is to reduce the percentage of imported defense equipment to about 10% of total defense materiel purchases. Spain has already reduced the percentage of imported equipment from an historical average of 50% to approximately 35% of its materiel acquisition costs. Thus, the money spent on the purchase of foreign weapons systems will be reduced considerably and will consequently be available for procurement from national industries. Spain intends to offer all procurement to national industries able to meet the requirements of the armed forces. When they cannot, Spain will give priority to those purchases which will involve international cooperative programs, preferably with European producers. As a last alternative, Spain will procure from abroad with an interest in receiving the maximum level of industrial compensation for Spanish producers and in technology transfer.

Spain has also entered into a number of multinational agreements for joint arms production with other NATO countries with strong arms development and industrial capabilities such as West Germany, France, Italy and the UK. The benefit of Spain's NATO membership to the country's defense industries can be seen in the increasing number of joint European programs in which it is becoming involved with major NATO producers.

Agreements with France include the possibility of a new main battle tank, the Exocet and Roland missiles and submarines. Other agreements include those with Germany on a 25mm anti-aircraft gun and the Roland missile; Italy on the Aspide/Skyguard missile air defense system; and the UK along with Italy and the Netherlands on the Tornel anti-tank helicopter. With Spanish collaboration on the Roland and Aspide/Skyguard missile systems, some observers now feel that Spain has the capability for independent missile development. In 1985, Spain announced plans to invest \$1.6B (US) in the joint research programs of European weapons producers over the next ten years.

Access to Western technology has bolstered Spain's expanding defense industries and its membership in NATO has effectively broadened the country's arms exports markets. The restructuring and streamlining of Spanish defense industries has enabled Spain to gain a significant share of the Third World arms market. Spain now ranks eighth among world arms exporters to the Third World, with a share of almost 2% of total world sales. Exports from a number of defense industry sectors are proving most promising with the Middle East, Africa and Latin America becoming major markets for Spanish arms producers. These new trends, fostered by

government support, are giving Spain's defense industries, both privately owned and nationalized, new incentives to invest more effort and capital to improve their capabilities, which will further enhance the Spanish defense industry.

SPANISH DEFENSE AND INDUSTRY COOPERATION

The defense industrial program also established a new Ministry of Defense (MoD) organization for the acquisition of materiel. The Dirección General de Armamento y Materiel (DGAM) will ultimately have the responsibility for the acquisition of defense materiel. DGAM will unify the different acquisition policies and programs of the three services and focus defense procurement to have the most positive effect on Spanish industry and the economy. The underlying philosophy is to ensure that the highest percentage of defense procurement is done through national sources and to facilitate the transfer of foreign technology to Spanish industry. The efforts by DGAM will include the management of R&D, defense procurement, incentives to Spanish industry and international collaborative programs.

The Comisión Asesora de Armamento y Materiel (CADAM) was established to ensure better coordination between the Ministry of Defense and the defense industry. CADAM is composed of 26 representatives from the defense industries and the Ministries of Defense, Industry, and Economy. The purpose is to provide information to industry about short- and long-term requirements of the armed forces, to provide a forum between the two establishments and to identify the need and possibility of acquiring patents and new technology. CADAM also allows for the representatives of industry to work directly with the Spanish MoD on major programs such as the F-18 co-production program.

INDUSTRY CAPABILITY AND MAJOR PROGRAMS

While Spain continues to purchase significant amounts of defense products from foreign sources, Spanish policy is to encourage its defense sector to manufacture armament and munitions using national industrial facilities whenever possible. As a result, Spain is developing a respectable defense production capability for major systems; however, much of that capability is still dependent on foreign sources for critical subsystems and components. In an effort to develop an autonomous arms production capability, significant investments have been made to modernize industrial facilities, increase national content of Spanish production and boost capacity. These investments in capacity are to cover both defense requirements and export goals. Spain has also entered into numerous multi-national agreements, primarily with NATO countries. The emphasis in these multinational collaborative efforts is to gain access to new technology and to develop the capability to produce a wide range of more sophisticated

defense products. The Spanish defense sector, through the above efforts, is now supplying an increasing proportion of the nation's military equipment as well as becoming an aggressive force in the world arms market.

There are three key elements of the Spanish defense industry: small-arms and army weapons systems; aircraft manufacture and maintenance support; and naval shipbuilding. Spain is now the world's fourth largest shipbuilder in combined military and commercial tonnage. Although Spain possesses manufacturing facilities for practically all of its armed forces requirements, each of the three sectors is actively engaged in a number of multi-national programs to strengthen existing defense production capabilities. The Spanish armed forces modernization program has top priority and efforts are underway to upgrade production capabilities in each of the three key elements of defense production. The requirements for upgrading defense systems have been divided into short-term and long-term programs.

1. Short-Term Modernization Programs:

Under short term programs, Spain has entered into a number of joint production agreements to modernize force structure and upgrade production capabilities. Short term programs include the joint production of weapons systems such as the F-18 aircraft, the AMX-30 Main Battle Tank, the Roland and Aspide missiles, and the FFG-7 frigate. With collaboration and participation in the production of these types of weapon systems, Spain is furthering its capability for the independent development of follow-on systems. The Defense Marketing Service (DMS) defense market report has predicted that Spain's participation in Aspide/Skyguard and Roland missile production will provide Spain with the capability for independent missile development.

2. Long-Term Modernization Programs:

In an effort to further develop their defense industry into an efficient and technologically capable tool for the country's defense and economy, The Spanish have entered into collaborative development and production programs with a number of European countries for a new generation of weapon systems. These efforts include the new European Fighter Aircraft (EFA), a separate program for the development of the EFA jet engine, the Augusta A129 (TONAL) antitank helicopter, a main battle tank (50 ton with 120 mm gun), the European TRIGAT (Third-Generation Antitank missile program for the 1990's), and the NATO Frigate Replacement project (NFR-90). Spain has entered into several major programs with the US including the Ada Project Support Environment, 155 mm Autonomous Precision Guided Munitions, Modular Stand-Off Weapon, and the Battlefield Information Collection and Exploitation System (BICES). Spain is also committed to participate with the United States in the following projects: Local Area Missile

System/Multifunctional Radar, Low Cost Power Dispenser, Multi-function Information Distribution System, NATO Integrated Electronic Warfare System, Naval Identification System, and the SINS laser ship gyroscope.

Spanish defense production is still far from an indigenous production capability and is heavily dependent upon foreign sources for key components. Long-term programs, however, are placing a heavy emphasis on getting involved in the R&D of new systems and developing a capability for the production of critical foreign sourced components such as electronic and avionic systems and jet engines.

The Spanish defense industry currently holds twelfth place in total world sales and has developed a number of reputable defense products that are successful in the world arms export market. Many of these successes have come in less technically demanding areas such as light infantry weapons, artillery, and infantry vehicles. More notable efforts by Spain include the C101 Aviojet trainer or strike aircraft, C212 Aviocar small transport, and the CN-235, a medium transport aircraft. The two transport aircraft come in civil and military versions, including ASW and maritime patrol options. Other significant efforts include the Teruel multiple-launch rocket system, an aircraft carrier for use with the AV-8 Harrier aircraft, destroyers and minesweepers, a new class of 300 ton patrol craft with anti-ship/anti-air roles, the VCA-36 air cushion vehicle, towed 155 mm artillery and the BMR-600 armored vehicle. Spain has also begun initial development work on a new fighter aircraft known as the AX to replace the Spanish Air Force's F-5's in the 1990's and is seeking international partners in that project. Spain's industry also produces vehicles of all sizes for a wide range of combat support functions.

Spanish small arms and infantry weapons are used throughout the world and enjoy a solid reputation for reliability and performance. Spain produces for export pistols; assault rifles; submachine guns; mortars including 60 mm, 81 mm and 120 mm; bazookas; anti-tank guns and rockets; and anti-aircraft guns. Spanish companies also produce a wide range of munitions including aviation bombs, small and medium caliber ammunition, large caliber artillery and anti-tank projectiles, grenades, pyrotechnics, and explosive charges. The production base for ammunition is autonomous with an impressive capability for metal parts and energetic material production. While the scale of production quantities required for Spanish companies is well below US mobilization needs, Spain production capacities for ammunition production exceed those in most other NATO countries. Moreover, Spanish collaboration with NATO producers requires conformance to US and NATO standards and specifications and the ability to work with drawings from all NATO countries. This capability makes Spanish producers an invaluable alternate source for many types

of munitions. Spain's impressive ship building industry would also provide a much needed capability within NATO for the construction, overhaul and maintenance of ships, including the repair of battle damage in a crisis.

DEFENSE INDUSTRY ASSOCIATIONS

A group of Spanish defense manufacturers have set up a company known as Defex to help promote, market, arrange financing for and sell Spanish defense products in the world export market. These companies, both private and government owned, are the major defense producers within Spain. The companies involved are CASA, Empresa Nacional Bazan, Empresa Nacional de Optica (ENO), Empresa Nacional de Santa Barbara, Esperanza y Cia (ECIA), Experiencias Industriales, Explosivos Alaveses (EDB), Instalaza, S.A. Placencia de las Armas (SAPA), Plasicas Oramil, Star Bonifacio Echeverria (Star) and Union Explosivos Rio Tinto (ERT).

Early in 1985 a second industry group was formed to represent all producers of defense materiel. The Asociacion de Fabricantes de Armamento y Material de Defensa (AFARMADE) is a private, non-profit company whose objectives are to represent and defend the interest of Spanish defense producers and to enhance the small defense producers' access to international markets. Both associations are currently the best sources of information on Spanish defense production capability.

WORLD SUPPORT RESEARCH TEAM SURVEY OF SPANISH DEFENSE INDUSTRY

During the week of 14 to 21 February 1987, a World Support Base research team visited Spain to study its defense industry and to survey existing and planned defense products. The purpose of the visit was threefold: first, to identify alternative sources of defense materiel that could be used to augment and expand U.S. defense production; second, to assess the capability to provide logistic support and maintenance and overhaul services to US and Allied forces; third, to identify sources of information and centers of knowledge on Spanish defense production capabilities that can be used for further research and planning.

The following sections provide a summary of the research team's general observations of the Spanish companies visited, detailed reports of companies visited by the research team and recommendations for further research.

GENERAL COMMENTS

1. Autonomous Production Capability and Dependence on Foreign Sources

Although Spain possesses manufacturing facilities for practically all of its defense production requirements, it is still highly dependent on foreign sources for critical subsystems and components in most of the major weapons systems it produces. Investments in plant modernization were evident, however, the diversity of the Spanish production visited ranged from very sophisticated production technology incorporating computer aided design/manufacturing (CAD/CAM), automated material handling, robotics, and composite materials to dated production facilities utilizing labor intensive processes and equipment. A major strength of Spanish defense industry is an impressive metal fabrication and assembling production capability including forging, machining and investment casting; all are potential bottlenecks in any significant expansion of defense production.

2. Business Base

Many of the companies visited had commercial production and operations integrated within the plant facilities, primarily to maintain an adequate business base. This represents additional capacity for acceleration and expansion of defense production in a crisis; however, it also demonstrates the difficulty that Spanish defense materiel producers have in maintaining an autonomous capability within the existing arms market. Exports are an important sales base for some major Spanish producers and for one company account for approximately 85% of total sales. Exports account for 25% to 50% of sales for many Spanish defense producers. Loss of sales abroad could have a deleterious effect on many of the major defense producers, thus threatening Spain's program to make the defense sector a major contributor to its economy and defense capability.

3. Logistic Support Capability

Spanish defense companies have demonstrated an impressive capability to support US forces in the repair, maintenance and overhaul of major weapons systems. In the past, Spanish companies performed battle damage repairs to US equipment in service in Vietnam. The bulk of military equipment purchased from foreign sources is from the US and many Spanish firms are well experienced with US equipment, including US military maintenance requirements, procedures and standards. As an example, CASA has the sole US maintenance depot in Europe for the F-15 and will provide depot support for the F-18. CASA has provided programmed depot maintenance support since the mid 1960's for the F-4 to US Air Forces in Europe (USAFE). Spanish industry also provides support and maintenance for the M-48 tank and the capability to

modify and overhaul a wide range of combat vehicles. Spain's ability to provide all types of logistical support to US and NATO armed forces should not be overlooked in any contingency planning.

4. Quality Assurance

All of the companies visited demonstrated an emphasis on quality assurance, and quality control procedures and methods were integrated into the production process. The structure of quality assurance elements and levels of conformance varied from plant to plant but in all cases met the required levels necessary for the production of the systems or materiel being produced. Spanish companies demonstrated a remarkable versatility to work with quality assurance documents and requirements for any number of NATO countries within the same plant. Many are producing to US and international specifications and requirements, both commercial and military. In some companies production lines within the same plant are being controlled by any number of NATO member nation military requirements, or in some cases by international commercial quality specifications. All companies had in-house capability to perform required quality and reliability tests. Larger companies had extensive laboratory facilities for physical and chemical analyses, computer diagnostic equipment, calibration laboratories and nondestructive and destructive product assurance testing facilities.

5. Other

Plant safety requirements were apparently not as strict as those required in US production facilities. While management interest and adherence to good safety practices were evident there appeared to be worker resistance to the use of safety equipment. Most notable was the almost total lack of use of safety glasses in metal machining and welding production areas. Few workers had earplugs on in high noise areas, or respiratory safety equipment in areas with high concentrations of hazardous pollutants and dust particles. Although safety devices were present worker noncompliance to good safety practices appeared to be widespread.

SUMMARY AND RECOMMENDATIONS

The survey of Spanish industries provided the World Support Base research team with a good overview of Spanish defense production capabilities. The brochures, written information, briefings and insights from follow-on discussions will support the World Support Data Base. Unfortunately, due to the limited time, only a few key companies were visited. Moreover, a critical defense industrial sector, shipbuilding and repair, was not surveyed. Spanish shipyards represent a much needed production capability for the U.S. and NATO armed forces. With shipbuilding

capacity declining in most NATO nations it is vital that defense planners have a much better understanding of Spanish ship building capability.

With few exceptions, Spanish defense companies can provide any repair, maintenance, modification, overhaul, or any other type of logistic support services required by the U.S. and NATO forces. Spanish companies such as CASA has been performing depot maintenance for the U.S. Air Force since the mid 1950's. All of the firms visited were familiar with U.S. military specifications and quality assurance standards. Many of the firms were familiar with U.S. and other NATO nations' equipment now in service with Spanish defense forces.

Ongoing co-production efforts, licensing and joint R&D programs with NATO defense producers are further developing the technological capability of Spanish defense firms. Many of the firms should be considered as an alternate source for both production and spare part requirements. Spanish producers could also fill a critical production shortfall in munitions and metal parts such as forgings, castings, and machined parts for any expansion in defense production in a crisis. Spanish companies produce many types of standard NATO caliber ammunition including battle ammunition such as the 155 mm howitzer projectile and propelling charges.

Spanish defense industry has also developed several weapons systems that may prove useful to U.S. forces. Although the focus has been to supply Spanish defense forces and for export to Third World nations, some of the products may have use to special and light infantry forces and non-NATO allies. Other defense materiel such as combat support equipment, trucks, and service vehicles could also be supplied by Spanish firms. Co-production and collaborative development programs with many of NATO's top defense producers will further enhance Spanish defense production capability to supply U.S. forces with a wide variety of defense material.

COMPANY REPORTS

The Spanish ministry of Defense and the US Military Assistance office selected for the World Support Base team a number of defense firms that represented a good cross section of Spanish defense production capabilities. The companies selected were also representative in size, product diversification, and level of sophistication of the defense industrial sector. The team visited nine manufacturing plants which can be categorized as follows:

1. Aircraft: CASA is the major firm in the Spanish aircraft industrial sector for both military and civil needs.

2. Land vehicles and armament:

- ENASA produces all types of military and commercial vehicles including armored personnel carriers.

- Santa Barbara is the major supplier to the Spanish army for all types of armament including the Tereul multiple rocket launcher system and towed 155 mm howitzers.

3. Light infantry weapons:

- SAPA is a supplier of anti-aircraft guns and ammunition and a subcontractor to Spanish armament producers.

- ECIA is the major producer of mortars and mortar ammunition in Spain.

- Star and Llama both produce pistols. Star also supplies submachine guns to Spanish military forces and exports assault rifles.

- Santa Barbara produces a wide variety of infantry weapons, in particular the 5.62 mm assault rifle.

4. Electronics: Grupo Inisel, which is composed of a group of electronics firms, was the only defense electronics producer visited. The particular company visited was EISA, which produces fire control systems, communication equipment, sonar and radar.

5. Munitions: Expal and Santa Barbara are the major producers of energetic materials, large caliber ammunition, and aviation bombs.

The team also visited associations that represent Spanish defense industry. Individual reports on each of the companies visited follow.

Defex

Management

Mr. Luis Perez De Guzman, Deputy Area Director

General

Defex is an association of defense industry firms and is supported by the Spanish Ministries of Trade, Defense and Interior Affairs. Its mission is to promote the Spanish defense industries and exports to the world market. Services include the promotion of defense material sales, logistic support and service, overhaul and maintenance for a wide range of defense products, and financing arrangements. Defex also coordinates government and company-sponsored training programs in support of export sales.

Defex strategy is to focus where Spanish industries are most competitive and in Third World markets. Exports are necessary to maintain a viable Spanish defense industry in order to support Spain's armed forces. Spain has a strong basic industrial capability (such as metal processing) but does not consider itself a sophisticated defense producer. Armament is rather simple, so Spanish industry can be responsive. Technological capability is, however, a long term goal and Spanish producers are encouraged by the government to team up with US and other NATO producers in collaborative efforts.

Defex management stated that their biggest competitors, in terms of price and quality, are the Warsaw Pact countries. India is deemed to be a very strong future competitor. Other competitors in third world markets include Brazil, Korea, Pakistan, and Singapore: however, Defex management feels that while these countries could beat Spanish producers in cost, their quality and range of products are not competitive.

Company Organization and Structure

Defex is 100% owned by Spanish defense companies which in turn are 51% government owned. There are two divisions. The Commercial Division is engaged in the promotion of defense products exports. The Finance Division arranges bank financing for countries that buy Spanish defense products. All major Spanish defense companies involved in exporting defense products are members of Defex. Since membership is expensive, only large companies belong to this organization. Defex is a small organization and has several offices located internationally, including the District of Columbia.

Observations

1. Defex is a valuable source of information regarding Spanish defense industry capabilities.

2. Based upon observations made in plant visits, Spanish technological capability is improving, in some cases quite dramatically. There are numerous licensing arrangements and collaborative efforts with many top US and other NATO defense producers.

3. Spain is willing to enter into international programs in order to sell its products, e.g. CASA's C-101 with Chile and the C-235 with Indonesia.

AFARMADE
(Spanish Association of Arms and Defense Material Makers)

Management

Mr. Felix Alonso Majagranzas y Acha (Director General)

General

AFARMADE is a professional, private, and non-profit association of Spanish defense industry firms. It was organized in 1977 to defend and promote the interests of Spanish producers of armaments and defense materiel. The association currently represents 55 Spanish companies which account for about 96% of the Spanish defense industry. The primary goal of this association is to assure that activity and investment are rationalized and in harmony with the government security and economic goals and to the benefit of its member companies. The size and number of the companies in AFARMADE are broken out as follows:

<u>Company Size</u>	<u>Number Represented</u>
1 to 100 employees	29
101 to 500 employees	20
Over 500 employees	6

The six largest are E.N. Bazan De Construcciones Navales Militares S.A.; E.N. Santa Barbara De Industrias Militares, S.A.; CASA; EXPAL; Pegaso; and Inisel S.A.

The qualifications for membership are that a firm must:

- (1) Have activity within Spain,
- (2) Have the capability to produce defense products, and
- (3) Be in the D.G.A.M. (Register of Industrial Firms).

AFARMADE's objectives are to represent and defend the interest of Spanish defense producers, advise the Spanish government on the needs of the defense industry, promote cooperation between various defense firms in Spain, perform statistical studies for the industry, and promote international collaboration and coordination of the technical interchange between different national and foreign producers.

Company Organization and Structure

AFARMADE is directed by two bodies. The General Assembly is made up of all members of the association and has overall control. The assembly elects the Directive Board which directs the affairs of the association. The membership of the Directive

Board has a minimum of five members and a maximum of fifteen members.

AFRAMADE has four working groups among the General Assembly which are divided among the industrial sectors of weapons, transport, R&D, and parts, components and material. The working groups provide the expertise needed to address a wide range of association activities. These include the translation and dispersal of technology, specifications and standards; the participation in international working groups such as NATO's Industry Advisory Group (NIAG); the cataloging of Spanish defense production capability; and assisting in the development of seminars and exhibits to promote Spanish industry. The Association has a small central staff to manage and direct its affairs. Most of the staffing and work is done by the representatives from member companies.

Observations

1. AFARMADE would be a good source of Spanish defense production capabilities and capacity information. It had just completed a capability and capacity study for the production of 155mm artillery ammunition for the NATO Maintenance and Supply Agency (NAMSA) when the team visited.

2. AFARMADE's overall objective in such a study is to catalog Spanish defense materiel and support capabilities. This will include the capacity of contractors, subcontractors, and alternate sources and ways to better balance production within the country. (NOTE: AFARMADE's study effort was verified by each firm visited. All were asked about the survey --each company stated that it had completed the survey). We were told that we could ask for that kind of information through the proper channels and it would be provided.

3. The association's mission also includes informing the Spanish government on wartime production capacity, the emergency production of defense materiel and the identification of non-defense firms which would be able to support defense production. It can also provide a broad overview of the vendor base which supports defense production.

CASA
(Construcciones Aeronauticas, S.A.)

Management

Mr. Javier Alvarez Vara (President and General Manager), Mr. Carlos Marin (Vice President), Mr. Juan Alonso Castro (Director of Marketing), Mr. Alberto Elvira (Engineering Director) and Mr. Alberto Fernandez (Production Director).

General

This company was formed in 1923 for the primary purpose of producing metal aircraft for the Spanish Air Force. It began by assembling the Breguet XIX under license and has since produced many other aircraft of foreign design, the most recent being the Northrop F-5 fighter and German MBB BO-105 helicopter. CASA is involved in marketing, product support, and research and development with a number of international aviation firms.

The company has designed several aircraft under contract to the Spanish Air Force including the C-212 Aviocar transport and the C-101 Aviojet trainer/light attack aircraft. CASA is also involved in international collaboration programs with P.T. Nurtanio of Indonesia and ENAER of Chile. CASA also undertakes maintenance and modernization work for the Spanish Air Force and Navy and for the US Air Forces in Europe (USAFE). CASA has produced over 3600 aircraft, and overhauled, including battle damage repair, approximately 6500 aircraft.

Company Organization and Structure

The majority stockholder in the firm is the government holding company INI (Instituto Nacional De Industria): other shareholders include Northrop Corporation of the US (13.3%) and MBB of the German Federal Republic (11.1%). CASA has over \$4.2 B (US) in assets and spends approximately \$3.5 M (US) in research and development.

CASA has five production sites located at Getafe (Madrid), San Fernando (Madrid), Tabalda (Seville), San Pablo (Seville) and Cadiz, Spain. A sixth site, Ajalvir (Madrid), is an engine overhaul facility. The company has a total of over 270,000 square meters of covered work areas.

Work Force

The company employs approximately 10,000 people, with approximately 14% holding college degrees and an equal number of technicians. About 9.5% of the work force is assigned to quality assurance. Turnover is very low and like most European companies must conform to very strict labor laws. It is difficult to lay

employees off and as a result the company would not hire additional people unless absolutely necessary.

CASA Aerospace Programs

Defense Production:

1. C-101 Aviojet: The C-101 has two versions, a single engine jet trainer and a light attack fighter. Aircraft have been exported to Chile and Honduras.

2. C-212 Aviocar: A twin turboprop light transport aircraft. Military versions include an ASW/Maritime Patrol and ELINT/ECM type aircraft. The C-212 has been exported to Indonesia (and assembled there), Panama, Paraguay, Portugal, Columbia, Somalia, Sudan, Uruguay, Venezuela, and Zimbabwe.

3. C-235 Regional transport (developmental): This is a co-development and co-production effort with P.T. Nuritanio of Indonesia. The project has been having some design problems and is behind schedule.

4. Participation in the Eurofighter development program

5. Assembly of the Federal Republic of Germany's MBB B-105 helicopter

6. Production of various items for the F-18 (flaps, speed brakes, stabilizer, etc.)

7. Production of the center fuselage for the Mirage F-1 fighter.

Commercial Production:

1. Airbus A300/310/320 subcontractor producing the horizontal tail surfaces, landing gear doors, and forward passenger doors.

2. Parts for the McDonnell Douglas DC-10 and MD-80, and Boeing B-757.

3. Production of major components for Sikorsky S-70 and H-60 helicopters.

4. Other programs include subcontract and overhaul work for Canadair CL-215, Bell 47G, 204, and 205 helicopters and Dassault-Breguet Falcon 100 light business aircraft.

Overhaul and Maintenance Programs:

1. Maintenance/overhaul of numerous aircraft, including US F-4, in the past, and the F-15 and BAe Matador (Harrier) and numerous commercial aircraft currently.
2. CASA has been active in the maintenance and depot repair of US Air Forces in Europe (USAFE) aircraft since the 1950's and is the sole European depot facility for the USAF F-15.

Observations

1. The company has devoted a great deal of resources in the development of generic technology through a balanced program of collaborative programs and its own research and development. This move into higher technology programs is indicated by a 100% increase in technical staff since 1981 (1200 now vs. 600). They currently design systems for their own aircraft and have an impressive design and manufacturing capability for aircraft structures. CASA has developed three multipurpose aircraft for both civil and military use and has an international presence in export sales and co-production.
2. The company is well known for its worldwide product support and maintenance capability. CASA is fully capable and experienced in combat damage repair. It worked on F-4's from Vietnam in the 1960s. This company presents a valuable capability to augment US aircraft maintenance and emergency repair capability and spare parts manufacture.
3. CASA has an extensive manufacturing capability with significant investments in automated and technologically advanced production equipment. The company has a great deal of computerized numeric controlled (CNC) equipment and machine tools, including five-axis milling machines and robotics for material handling and composite material finishing. The company claims to have a flexible machining center however, it was not shown at the facility visited.
4. CASA has invested heavily in the capability to produce composite material structures in the last ten years and has become a major supplier of composite material structures for a number of US and European programs, including the F-18. The facilities include large dimension autoclaves, automated ultrasonic testing, NC core milling and cutting machines, automated x-ray testing and aluminum deposition equipment. Workmen were still laying up almost all of the composite material parts by hand.
5. The CASA developed aircraft rely on several critical foreign sourced systems and components. Engines, for example, are supplied by Garrett, US; and communications by Collins and Magnavox, US.

6. There is some mobilization and surge capability since most operations are running on a 1-8-5 shift basis. All plants work to US and international aviation specification and quality standards. NC machining capacity is currently operating at 3 shifts and would require a significant expansion in machining capability to accelerate production. Current production rates are 4 per month for the C-101 and the C-212.

7. One area of concern was the rather low level of work in the composite lay up facilities and the under-utilization of very expensive plant and equipment which appeared to have been purchased to support new programs such as the F-18. No determination could be made as to whether this facility was beginning to ramp up production or was working at a low business base.

Grupo Inisel
(Empresa Nacional de Electronica y Sistemas, S.A.)

Management

Mr. Juan Vizoso (POC) , Mr Luis Ferreiro Centenaria, Director Industrial Operations, Mr. Antonio Sanchez, Telecommunications Engineer, and Mr. Enrique Deiz Soto, Chief Programs, Projects Department.

General

Inisel leads a group of companies engaged in the design and manufacture of a wide range of electronic components and systems for both military and civilian applications. It is a government-owned firm that is currently going through a restructuring of two companies, EESA (Electronica ENSA SA) and EISA (Experiencias Industriales,S.A.). A list of the companies comprising the Grupo Inisel is at Appendix A. Grupo Inisel production is about 60% defense oriented. We visited EISA, one of the two Inisel factories, in Aranjuez (Madrid), Spain. EISA was involved in the manufacturing of fire control systems, military optical systems, missile subsystems, laser telemetry systems, electronic counter-measure systems, and other electronic items.

Both merged companies have been involved in a number of military production programs under license from the US and other NATO countries. Some of the major system work includes the Hughes Mark VII sight and fire control system for the M-48 tank, the Lear Siegler Weapons and Communication Control System for the F-18, the Shipboard Command and Communication and Launch Control System for the Harpoon Missile (with McDonnell Douglas), and other work for the Roland and Aspide missile systems and the AMX-30 tank.

Company Organization and Structure

This company is currently undergoing a restructuring with the merger of two major electronics firms into an electronics public holding company which heads a group of electronics firms. Grupo Inisel is 100% owned by INI, a government holding company. These companies include ENOSA, ERIA, ERDISA, I-CUATRO, ISEL, PESA and TELSINCRO. All specialize electronic products, systems, and services for both defense and commercial uses.

Sales exceeded \$172 M (US) in 1985 with exports accounting for approximately \$31 M (US) in 1986. R&D expenditures were over \$13 M (US) or nearly 9% of sales. The company under the recently formed group has a backlog of over \$220 M (US). Aerospace and defense work accounts for over \$61 M (US) or approximately 43% of sales. Other major business activities include medical, software development, CAD/CAM services, design and development of business

computers and peripherals, industrial electronics, optics, hardware production, and radio and TV broadcast equipment.

The total area of the San Fernando plant is 30,000 square meters; the Aranjuez facility is 37,000 square meters. A third facility is near the US Air Force base at Torrejon (Madrid).

Work Force

Grupo Inisel employs some 2850 people with 1200 employed at the headquarters and two factories and 1650 in the other companies. Approximately 1100 have degrees or specialties in a particular area of electronics, 1300 are in manufacturing, 100 in quality control, and the remainder in support and general administration. Overall labor hours available are 450,000 per year: engineering and software design account for 126,000 hours per year on a 1-8-5 basis.

Defense Products

In an effort to become self sufficient in the production of arms for its own defense forces and for export Spain has signed numerous agreements for joint production of military systems, placing emphasis on military electronics. A number of Spanish firms will have a 50% share in the production of the Euromissile Roland air defense system ordered by the Spanish armed forces. Grupo Inisel will build the electronics and optical systems. With the collaboration with Italy's Simmel's ASPIDE/SKYGUARD system, Spain is deemed capable of developing its own missile systems, with Inisel playing the major role in electronics and optical systems development.

The merger of these companies provides a broad base for military electronic production. Inisel also is involved in production work for the Harpoon missile, M-48 tank fire control system, the F-18 weapons and communications control systems, laser forward observer telemetry systems, ECM systems, sonar and torpedo subsystems, tactical consoles, and proximity fuses.

Observations

1. This organization was obviously in the throes of a major reorganization. The plant that was visited seem under-utilized. Its machine tools were old, but the company has begun to make large investments in NC machines. There is also a large (about 200ft. by 100ft.) clean room under construction. The company also had a wide range of automated analog and digital circuit card testers and component insertion equipment.

2. Quality control manuals have been approved by both American and European partners and conform to NATO AQAP-1,2, 4, 6

and 9 and MIL-Q-9858. INSEL's work force and production systems are very flexible due to the licensing arrangements with many different countries. The company can work with drawings from the US, France, Netherlands, Italy, Germany, and others.

3. Spain's electronics industries are generally small and do most of their business in-country. The decision of the Spanish Government, and in particular the military, to reshape and modernize the defense industry will play a major role in determining future growth and capability of this critical defense sector. The electronics industry is being singled out for growth. This will be done through direct government support and through offsets and licensed production from the purchase of foreign military systems.

4. INSEL plans to devote \$16 million (US) annually for research and development to achieve both a strong technological capability and independence. There will also be a strong emphasis on international cooperation and multinational programs to further achieve the long term goals of growth and technological independence.

ENASA
(Empresa Nacional de Autocamiones, S.A.)

NOTE: Pegaso is the product name of its commercial products. The company is known more by Pegaso than as ENASA.

Management

Mr. Federico Sotomayor Gippini, President; Mr. Manual Seco, Director Military Vehicle Engineering; Mr. Jose Miguel Blasco, Executive Director, Marketing, Military Division; and Mr. Laureano Villar Bueno, Export Sales Manager.

General

ENASA was founded in its current form in 1946 but its roots go back to 1904. It is 100% owned by the government holding company INI (Institute for National Industries) and was at one time owned in part by British Leyland and International Harvester.

ENASA is the largest manufacturer of transport vehicles in Spain and exports trucks, buses, engines, and military vehicles to approximately 40 countries around the world. Approximately 65% of each vehicle is made at ENASA and almost all of the purchased truck parts are made in Spain. This firm manufactures engines, trucks (all sizes), buses, and service and maintenance vehicles for the civilian sector as well as for the military. ENASA produces most of its own engines, crankcases, gear boxes, front and rear axles, injection pumps, and related parts. Although the foreign content is almost nil, the company buys the sheet metal for its truck cabs from the Netherlands.

ENASA does its own R&D for trucks, buses, and armored vehicles. The company has several licensing arrangements and joint ventures for major components with firms such as MAN for buses, Bosch for fuel injection pumps and SETAF for gear boxes. It produces industrial vehicles that range in size from the smallest commercial trucks to 80 mt capacity vehicles. ENASA also produce an extensive product line of service and maintenance vehicles such as tankers, tow trucks, and flat bed trucks. The facility has an automated foundry casting line (cast iron and aluminum) for engine blocks and major truck components. ENASA can manufacture 40 to 360 HP diesel engines.

Company Organization and Structure

ENASA had sales of approximately \$640 M (US) in 1985 with defense accounting for 40% of total sales. Exports accounted for \$90 M (US) with Africa and Latin America the primary market. Military exports account for \$54 M (US) or 60% of total export sales. The firm controls about 50% of the Spanish truck market

and 90% of the domestic bus market. Entry into the Common Market has opened the Spanish market and, as a result, ENASA has lost domestic market share. To counter this negative trend, ENASA is taking measures to improve its competitiveness and is developing an aggressive marketing program to promote the exports of both commercial and military products.

The production is accomplished in three plants: 1) Madrid--foundry, final assembly and sheet metal fabrication: accounts for nearly half the labor force; 2) Barcelona--major truck components; and 3) Valladolid--armored vehicles and small engines. ENASA also has production facilities in Chile and Venezuela and a sales organization in the UK. The Madrid facility is the largest and has over 1,800,000 square meters of space with 350,000 square meters covered. Production processes and operations are split into two major lines, vehicles less than 15 mt and vehicles that are greater than 15 mt.

Due to the down turn in business activity, current operations are below 50% of capacity utilization even on a 1 shift-8 hour-5 day per week basis. Excess foundry capacity is being used to do subcontract work, with Renault being a major customer.

Work Force

ENASA personnel stated that in 1979 they were at full capacity with over 13,000 people employed. Presently, they are working with 8500 and plan a further reduction of 2000 to a total of 6500 over the next two years. While the company was not specific on future personnel reductions there is concern regarding employee morale.

The average member of the work force is approximately 40 years old and has 20 years of service. Most employees are skilled or semi-skilled, with approximately 7.5% of the employees in research or development engineering. Company employees have tended to spend their entire work lives with the company and as a result ENASA has enjoyed very little turn-over in the work force. Worker training is both government sponsored and provided by the company as on-the-job and/or formal classroom training programs. The company did not perceive any critical skill shortage in the eventuality of a crisis or wartime situation.

Defense Products

The Spanish Army directed ENASA in 1972 to start development work on a wheeled Infantry Fighting Vehicle (IFV) to meet the requirements of the Spanish Army. ENASA was responsible for the automotive side of the vehicle development and the Army concentrated on the armor and armament installation. The BMR-600 was the result of that co-development and the Spanish Army selected

the ENASA entry over the Swiss MOWAG and the French VAB in comparative trials in 1979.

There are a number of variants of the BMR-600 including an amphibious model. They are:

- armored personnel carrier
- command vehicle or radio communications vehicle
- cavalry scout vehicle
- combat vehicles that can carry a 81mm mortar, 90mm cannon, or missile launcher
- recovery and maintenance vehicle
- ambulance.

ENASA also produces military trucks (all sizes) including a wide range of service and maintenance vehicles and an armored personnel carrier (BLR 4x4 light APC) for internal security. ENASA is also engaged in several new development programs including a tank transporter and an infantry tracked vehicle in the 22 to 26 metric ton range.

Observations

1. This company appears to be a rather capable and efficient firm. It is apparently intent on maintaining its competitiveness in world markets and is engaging in an aggressive program to market its military products worldwide.

2. ENASA is familiar with working in the world markets and has a good support and maintenance organization to support its overseas operations and sales. The Barcelona plant is responsible for making obsolete parts and the company is committed to maintaining supply of all parts for 10 years after they are out of production. The company has an impressive full automated store of spare parts for all of Pegaso's products. The company also provides extensive training and support for its export market.

3. Production:

<u>Type</u>	<u>Maximum</u>	<u>Current</u>
Civilian Trucks	37/day	26/day
Military Trucks	56/day	18/day
Engines	80/day	50/day
Cabs	104/day	40/day
APC's	2/day	3.5/week

The above rates are based on a 1-8-5 shift however, several critical operations are on more than a one shift basis.

4. Surge Potential: ENASA has produced as many as 30 of the BMR-600 IFV's per month on normal operations with some shift work and management is quite confident that without rearranging the plant they could easily reach 60 per month in less than six months. No concern was evinced regarding the availability of material. The aluminum armor plate, however, is imported from the UK. The constraint is gearboxes (SETAF, FRG license), which are made by ENASA.

5. ENASA represents a valuable and sizable industrial capability for NATO during a crisis situation. The company could provide overhaul, maintenance, and battle damage repair support for a wide range of military vehicles. More importantly, it could be a critical source of trucks, combat support vehicles, and infantry fighting vehicles.

6. ENASA meets most NATO and US military standards for products and quality control. Parts interchangeability meets most European standards for commercial trucks, making ENASA a valuable source for spare parts and the repair of retrograde material.

7. The company has significant capability in providing military supply support, on-site training of military technicians, spare parts control and inventory management and the development/production of special test equipment for the fault and isolation of automotive equipment.

8. ENASA has a special facility for the tropicalizing of automotive parts.

SAPA
(De Placencia De Los Arms, S.A.)

Management

Jose Ma Berasategui Liceaga, Director General

General

SAPA is a 100% privately owned Spanish company and was at one time owned by the Vickers Company of the UK. SAPA is one of the oldest company now operating in the defense sector, dating back to 1575. In recent years the company turned an unfortunate act of nature, inundation by flood waters from a nearby river, into an opportunity to modernize its machine tool operations. As a result the company has a well equipped and laid out machine shop capable of fabricating a wide range of metal parts and assemblies to close tolerances and with high quality.

SAPA manufactures anti-aircraft equipment, ammunition for the 40 mm Bofors gun, repair parts for anti-aircraft equipment, subassemblies for the AMX-30 MBT, subcontract parts for the Swiss Oerlikon VCTP infantry combat vehicle, and does depot level overhaul and maintenance work under contract with the Spanish Army. The company has an equal amount of non-military work including Shuttleless looms licensed from SNOECK in Belgium, Jeep and truck parts, gears and gear cutters, clamps, and pneumatic quick couplings.

Company Organization and Structure

SAPA is a small defense producer with a sales volume in 1985 of approximately \$21.5 M (US) of which military work accounted for over \$18.5M (US). The sales base for 1986 is equally split between commercial and military work. Exports account for approximately 25% of total sales. The company has two factories, Andoain (San Sebastian) with nearly 20,000 square meters of site space and Placencia with over 4,200 square meters of plant site area. Both are in the North of Spain in Basque country. Ammunition is produced at the Placencia location and most metal part fabrication is done at Andoain.

SAPA is also affiliated with a research and development laboratory in nearby San Sebastian to develop a 20 and 40 mm anti-tank gun turret for the new Spanish BMR being developed by ENASA. The company has also set up a small R&D laboratory for the development of a high speed weaving rapier loom.

Work Force

SAPA uses about 420 employees between its two factories. Management made the point that employees would be switched between the two factories as demanded by the workload. Approximately 280 employees, or two-thirds of the work force, are direct labor and most are highly skilled machinists and machine operators. The remaining 140 are administrative, engineering, and support personnel of which about 40 are engineers or technicians.

The company management stated that 98% of their employees never leave the firm. The average employee is 41 years old. Most employees had been with the company nearly 20 years.

Defense Products

1. 40mm/L70 BOFORS automatic Anti-Aircraft gun.
2. 20mm GAI-BO1 Oerlikon infantry and anti-aircraft gun system.
3. Complete overhaul, maintenance, and spare parts for the Spanish Army 20mm, 35mm, and 40mm anti-aircraft gun systems.
4. Assemblies, components and parts for:
 - AMX-30 Tank
 - 20mm OERLIKON VCTP Turret.
5. Armament in general according to drawings and specifications.
6. Ammunition for BOFORS 40L60 and 40L70 guns.
7. Diverse ammunition between caliber 20 and 40mm.
8. Ammunition with proximity fuzes for artillery and mortars.

NOTE: PRODUCTS BEING CONSIDERED

- Sea mines.
- Torpedoes.
- 20mm/40mm anti-armor/anti-aircraft gun systems.

Observations

1. This seemed to be a well organized and managed company with an impressive capability to take on contract maintenance work for the Spanish Army's anti-aircraft guns.

2. This company's cold production line would require an eighteen month start up time. The facility normally produces 4 gun systems per month, but could increase that to a maximum of 10 per month. Machining capacity is the principal bottleneck, with some machining centers now running on a three shift basis. In overhaul and maintenance work, floor space is the pacing constraint.

3. Most parts and assemblies are made locally, including pneumatic components, motors, and hydraulic and electrical controls. Forged aluminum parts for the AMX tank are imported from France.

4. This company has an impressive machining capability with both a wide range of metal fabricating and finishing equipment and a highly skilled labor force. The plant is well managed with little in-process work, good quality and process control, and efficient operations throughout the plant.

5. Due to reduced sales in the military sector, management has been flexible and the plant is currently doing a significant amount of commercial work. This has kept the business base at a satisfactory level and provides for additional surge or mobilization capability in a crisis.

6. SAPA provides an invaluable capability as a source of spare parts, light armament production, overhaul and maintenance capability and small caliber ammunition up to 40mm. Due to the capabilities of the work force and plant equipment, this company could probably make nearly any type of light infantry weapon with small investments in plant equipment and process development.

Star
(Star Bonifacio Echevarria)

Management

Mr. D. Bonifacio Guiasola Echeverria, President; Mr. Inaki De Subinas Guisasola, Director General; Mr. Jose Ignacio Valenciaga Guisasola, Director of Production; Mr. Luis Inchausti, Manager of Sales and Marketing.

General

Star is a family-owned company dating back to 1905 and is now run by the great-grandson of the founder. The company's main products are pistols and sub-machine guns for the civil public safety sector and the military. Products are also produced for the commercial market. Star does its own R&D and has no licensing arrangements for any of their current products. It produces all its own parts (with the exception of forging for the pistol housings which are imported from Italy) and markets its products worldwide.

Star is a small but well run company with one facility in the town of Eibar, located in Northern Spain. The company is well known internationally as a producer of .22 to .45 caliber and 9mm pistols with most of their pistol production exported worldwide. Star's major domestic customers are the Ministry of Defense and the Spanish internal security forces. The company also produces small numbers of rifles and shotguns and is currently looking to expand its product line to include assault rifles. As an interesting note, company managers pointed out that the government has a gunsmith training facility located in the town of Eibar.

Company Organization and Structure

The company has a total yearly sales of \$15 M (US) with exports accounting for about 37% of total sales. Star's export objective is to derive 50% of their total sales from exports. Of its two major product lines, pistols and sub-machine guns, the domestic market accounts for only 20% of Star's overall production of pistols while the Spanish military and the internal security forces account for over 84% of all sub-machine gun production. Nearly 80% of the company's pistol production output is for exports while less than 16% of its sub-machine gun output is exported.

Star is currently working on an order from the Spanish Government for 50,000 pistols and other NATO countries have shown some interest in its newest sub-machine gun, the Z-84. Since it began production the company has produced over 2,000,000 pistols and over 300,000 sub-machine guns. The plant covers over 10,000 square meters of fully utilized space with significant expansion

now underway. The company has a full range of metal fabricating capabilities with computer numeric controlled (CNC) machine tools, an R&D laboratory, a fully equipped quality assurance laboratory and a test range. There is little land area within the current plant site for any further expansion and it would appear that Eibar would have to go off-site for additional plant space. The town of Eibar appears to have both the needed facilities and labor pool for any planned expansion.

Work Force

The company currently has a labor force of slightly fewer than 300 people. Nearly all of them are skilled and have had over 10 years of service with the company. Star is a closely knit family-owned organization with the president (owner) and management deeply involved in the company's operations.

Defense Products

Star's defense products are currently limited to pistols and sub-machine guns that can fire a variety of 9 mm ammunition. Less than 5% of its total pistol production was for the Spanish armed forces, however more than 46% of its sub-machine gun production was shipped to the Spanish military. Star supplies many of these products to Spain's internal security forces, (Civil Guard, National Police and security police). The company also produces a variety of pistols in .22, .25, .32, and .45 caliber.

Star's three types of 9mm sub-machine gun, all feature rugged but economical construction techniques including metal stamping and investment casting enabling simple, high volume production. They are:

1. Model Z-70/B Star which was first introduced into the Spanish Army in 1971.
2. Model C2 sub-machine gun.
3. Model Z-84 (NATO) sub-machine gun designed as a light, simple, reliable, and effective tactical personal weapon. Intended users include special forces and armored transport personnel, where space may be at a premium.

Few details were available regarding Star's intended assault rifle, including its caliber (5.62, 7.62, 7.92, or 9mm) and its intended market. Spain, due to its small domestic market, attempts to rationalize production among its existing defense producers. Current production of assault rifles is done by the Santa Barbara CETME which is 100% owned by the Spanish government holding company INI.

Observations

1. The firm is internationally noted for extremely high quality design and reliable pistols and is emerging as a recognized producer of sub-machine guns by virtue of its latest entry, the model Z-84.

2. Export sales for pistols account for a large portion (approximately 80%) of Star's total production output. Peru and Venezuela are major export markets for the company's military products.

3. The plant is currently operating at over 80% of capacity on a 1 shift, 8 hour, 5 day week basis. Some operations, especially on NC machine tools, are operating on a multi-shift basis.

4. Current production rates are 250 pistols per day and 150 sub-machine guns per day. These rates could be accelerated by 30% within four months, however, additional output would require additional machining capacity. The company could not identify any critical materials or sources, but they do receive forged pistol housings from Italy.

5. The President and managers provide a significant positive influence by being deeply involved in the operation of the plant. The plant conforms to US MIL STD 105-D Quality Standards. Quality appears to be high, with low scrap rates and with very little in-process work.

6. The company keeps a large inventory of weapons in bonded stock for immediate shipment.

ECIA
(Esperanza y Cia., S.A.)

Management

Inigo Calonje, General Manager; Javier Mugarza Arrue, Director of Finance; Emillano Serrano Agreda, Chief of Quality Control.

General

Esperanza was founded in 1925 and until twenty years ago was privately owned. It is now held by a group of private companies through a holding company with no government participation. ECIA began producing mortars and ammunition from its inception and, since that time, has grown into one of the foremost mortar and ammunition manufacturers in the world.

ECIA produces a full range of mortars and metal parts for mortar ammunition from 60mm to 120mm and is the sole supplier of mortar tubes and mortar ammunition to the Spanish armed forces. The company began exporting ammunition in the 1950's and exports now account for 80% of total sales. ECIA is a member of Defex and AFARMADE. The company has a reputation for advanced engineering and world-wide sales with its main markets in Latin America, Africa and the Middle East. A major business goal is to enter NATO markets.

Company Organization and Structure

The company has one major production facility in Marquina (Vizcaya), Spain with a sales office in Panama. ECIA only produces metal parts. All load, assemble, and pack operations are done by another Spanish company, EDB in Burgos, Spain, with EDB's parent company, Rio Tinto (ERT), producing the energetic materials (explosives and propellants).

The product mix over the last five years has been 10% of sales for 60mm, 20% of sales for 80mm and 70% of sales for the 120mm. The 120mm mortar product is now being evaluated by the US and is in competition with an Israeli model. ECIA is supplied locally for most all of its raw and processed material, including raw castings. The mortars produced by ECIA are in current use by many armies throughout the world, including four countries in Europe, 11 in Latin America, 14 in Africa, and 13 in Asia and the Middle East.

Work Force

ECIA has approximately 400 employees with 70 engineers and technicians active in design, testing and quality control. The

company's production work force appears to be well experienced and highly skilled.

Defense Products

ECIA has teamed with General Defense Corporation of Red Lion, Pennsylvania for the US Army development of the 120mm mortar. The company is also involved with another Spanish company, Instalaza, in the development of carrier ammunition for the 120mm mortar and the adaptation of heavy mortars to pneumatic landing craft and armored vehicles. The major products of ECIA are:

1. Mortars:

- 60mm mortar (3 types): 60mm Commando mortar, 60mm model L mortar and 60mm Model MC-2 gun-mortar
- 81mm mortar (2 types): 81mm Model L-L/I-N mortars
- 120mm mortar (2 types): 120mm Model L mortar and the Model M-84 extended range mortar.

2. All standard ammunition for 60, 81, and 120mm mortars including HE, Smoke and Illumination rounds.

3. Special ammunition:

- 120mm anti-armor, anti-personnel ammunition
- 82 and 122mm ammunition
- Multi-product fuze manufacture capability.

4. Training ammunition.

5. Espin 15/Espin 21: A carrier type ammunition that is under development and will carry 15 or 21 bomblets which will be effective against armor or personnel.

Observations

1. One of the major strong points of this company is its ability to adapt its manufacturing lines to produce multiple designs according to customer needs. This company stays on the leading edge of technology and is a competitor in the world market.

2. Production Capability; on 2 shift per day, 8 hour per shift, 5 day per week basis:

<u>Mortars</u>	<u>Tubes/month</u>
60mm (Commando)	250
81mm mortar	125
120mm mortar	45
Fuses:	4500/month

<u>Ammunition:</u>	<u>Normal Product Mix</u>	<u>1 Caliber Only</u>
60mm	3700/day	4500/day
81mm	3200/day	3500/day
120mm	1500/day	2000/day

3. At present this company provides strong potential to augment US production of weapons systems and ammunition.

4. The company has significant forging capability including a 1000 ton press and several smaller presses in the 600 to 800 ton range. While the presses are old, ECIA has added automated handling equipment to optimize forging press output.

5. Although significant investment in NC machine tools, CAD/CAM systems and automated production lines is evident, there are still some manual operations throughout the plant.

6. ECIA utilizes lot control, superimposed sample testing and test firing to ensure quality and performance. The company establishes quality control throughout the manufacturing process.

7. ECIA has an impressive laboratory capability for product development and quality assurance. Product analysis that can be performed includes chemical, metallurgy, mechanical stress tests; tests for heat treatment; and non-destructive testing. The company has its own metrology laboratory for the calibration of test equipment.

Llama
(Llama Gabilondo y Cia., S.A.)

Management

Mr. Jose Ignacio Lecue, Director General and Mr. Carlos Zarreno.

General

Llama is a privately owned small arms manufacturer dating back to 1904. The company is primarily engaged in the manufacture of pistols and components for shotguns and rifles for the civil security and sporting markets. It also supplies the Spanish Army. Llama also has an impressive investment casting facility capable of producing a variety of precision, close tolerance mechanical parts of steel, cobalt, and nickel-based alloy materials. These parts have numerous defense, scientific, and essential commercial applications.

The company does all of its own R&D and licenses technology for the production of rifles. Most of Llama's output is for the export market and it currently ships products to over 60 countries. The products include a wide range of pistols from .22 L.R. to .45 automatic for the military, public safety, and police forces and civilian markets. Llama is a member of AFARMADE.

Company Organization and Structure

The company has one manufacturing facility located in Vitoria, Spain. The company has over 12,000 square meters of plant space with extensive metal fabricating and finishing, investment casting, and assembly capability. Production and quality acceptance is to international commercial and NATO military standards and specifications. Llama is also a co-owner with SAKO (Finland) of a wholesale gun distributor (Stoegar) in Hackensack, New Jersey.

The company is currently licensing a Columbian company (INDONEL) and assisting in setting up a production plant to produce an anti-riot shotgun. Llama is also in negotiation with Uzi (Israel) for a joint venture in the production of machine guns and pistols. Llama's 1985 sales were approximately \$11 M (US) with exports accounting for 75% of total sales.

Work Force

Llama employs a total of 225 personnel with over two-thirds considered highly skilled factory labor. Technical, administrative, and unskilled labor account for less than a third of the total work force. The factory labor appears to be highly skilled with an average age of 44 years old.

Defense Products

1. A 9mm Parabellum Model M-82 pistol for the Spanish armed forces and internal security forces.
2. Pistols, including .22, .32, .38 and .45 caliber, .357 and .44 magnum, and 9mm.
3. Components for shotguns and rifles under contract to other manufacturers.
4. Steel, cobalt, and nickel based alloy precision investment castings for automotive, aeronautical, scientific, and precision testing requirements.

Observations

1. This company is the primary supplier of handguns to the Spanish armed forces, however almost all sales and all exports were for non-military markets.
2. The plant is machine intensive and most machines are fairly new. The most impressive capability is the investment casting using the lost wax process and microfusion to produce high quality precision parts up to seven pounds in weight and 12 inches in size.
3. At present this company has the capability to accelerate and expand production to produce massive quantities of quality hand guns. Its facility is currently under-utilized. Continued development of microfusion technology will add considerable capability to this company.
4. Current production is 100,000 units per year and the plant is at 70% of capacity utilization on a one shift basis. Some operations, however, are on a two shift basis. Pacing constraints depend on the production mix but are generally machining operations. Production lines are highly flexible with most factory personnel capable of performing more than one task.
5. Llama has a wide range of metal fabricating and finishing capability. The company has invested in NC machining centers; extensive heat treating and surface protection equipment; and equipment capable of complete chemical, physical and metal graphical analyses.
6. All parts are held to close tolerances, making them completely interchangeable with each other. This capability enhances supply support and in-field service of all types of products. Several employees were observed, however, using metal files on production parts. This may have been a deburring

operation or the correction of a defect which may indicate a problem regarding interchangeability of parts.

EXPAL
(Explosivos Alaveses, S.A.)

Management

Mr. Ricardo Aparicio, Area Manager and Dr. Pio Borderio Garcia, Technical Manager

General

EXPAL consists of a group of privately held companies with ERT (Rio Tinto Chemical Company) as the parent company. The group of companies has wholly owned factories, in addition to other factories in which EXPAL owns a majority of shares and has controlling interest. A privately owned company, EXPAL was founded in 1946 and began by initially filling mortar and artillery rounds with explosives. Later it began manufacturing anti-tank and anti-personnel mines; 40 mm anti-aircraft fuzes; and began assembling entire mortar and artillery ammunition rounds. In the 1960's the company advanced into production of low drag bombs for the Spanish Air Force. EXPAL now constitutes a group of companies which conducts business world-wide, producing a wide range of munitions such as large caliber shells, mines, bomb bodies, fuse bodies, and other munitions and pyrotechnic items.

ERT is the largest chemical company in Spain and began operations in 1896 with the manufacture of explosives, pharmaceuticals, plasters, fertilizers, and chemicals for metal processing. EXPAL is one of several companies under the ERT Group of companies producing munitions. Most are producing metal parts and performing the load assemble and pack operations.

Company Organization and Structure

The parent company of EXPAL is Union Explosivo's Rio Tinto (ERT). ERT is a holding company with majority ownership in over 35 firms and 30 factories which are mainly active in chemicals and fertilizer production, mining, plastics, pharmaceuticals and metal processing. Total sales exceeded \$2.1B (US) in 1985 with exports accounting for approximately 25% of total sales. The explosives division of ERT produces a wide range of energetic materials and their intermediate chemicals in support of EXPAL's munitions production. ERT produces single and multi-base propellants, initiating explosives, TNT, and RDX/HMX based explosives.

EXPAL's operations are mainly centered in and near the cities of Vitoria and Burgos located in north central Spain. There are five manufacturing sites, three in the Vitoria and two in Burgos, with a total of 1,524,000 square meters of factory space. In addition to these facilities ERT has an explosives production plant collocated with EXPAL's Load, Assemble and Pack

(LAP) facility at the Paramo de Mesa site near Burgos. ERT also has a plant to produce propellant powders and load propelling charges at Galdacano (Viscaya), Spain.

<u>PLANT NAME/SITE</u>	<u>MANUFACTURING ACTIVITY</u>
o Forja Y Extrusiones (Vitoria)	Metal parts for bombs
o Explosivo's Alavesis (Vitoria)	Primers, fuses, grenades mines, boosters, LAP & small caliber ammunition
o Forja de Galicia (Orense)	Projectile metal parts
o Metalurgica de Extrusiones (Burgos)	Projectile metal parts
o EDB S.A., Paramo de Mesa (Burgos)	LAP-bombs & projectiles
o ERT, Paramo de Mesa (Burgos)	Explosives
o ERT, Galdacano (Viscaya)	Propellants & LAP of propelling charges

Up until 1960, Expal's total output was for the Spanish Ministry of Defense. Exports are now an important part of EXPAL's business base and account for 85% of the company's total sales. EXPAL's products are delivered to countries all over the world with major markets in the Middle East, Africa and Latin America. The company's aviation bombs are qualified for use on both NATO and Warsaw Pact aircraft. EXPAL's ammunition is fully compatible with NATO's weapons systems. The company has a number of licensing arrangements with Belgium, France, Italy, Norway, the UK, and the US for the production of munitions items such as fuses, small caliber ammunition, anti-tank/personnel mines, and artillery ammunition. EXPAL is also involved in extensive research for low level bombs and proximity fuses for bombs.

Work Force

EXPAL employs approximately 580 personnel which is less than 7% of ERT's total work force of approximately 8500. Nearly 21% of the work force are engineers and technicians. Factory labor accounts for over two-thirds of the total work force and most are skilled with specialized training. Personnel in Quality Control account for 5.5% of the work force and administration and support personnel slightly more than 8% of the work force.

Defense Products

EXPAL produces a wide range of munitions including grenades, anti-tank/personnel mines, demolition charges, detonators, explosives, flares and signal devices, anti-aircraft ammunition,

large caliber howitzer and naval ammunition, aircraft ammunition, and aviation bombs.

1. Aircraft bombs - Low drag, braked anti-runway, cluster, crater, fire, and practice. Also fuses for bombs.
2. Pyrotechnic items - flares, distress signals, smoke generators, and tracers.
3. Anti-aircraft ammunition - 20mm for the Rheinmetall, Swedish H&S and Oerlikon systems, and 40mm for the Bofors systems.
4. Aircraft ammunition - 20mm Vulcan and 30mm DEFA systems.
5. Grenades - all types.
6. Demolition charges, Bangalore torpedoes, detonating cords, detonators, and ignitors.
7. Mine laying, activating, and detection equipment.
8. Howitzer ammunition and propelling charges for 105mm, 122mm, 155mm, 175mm and 203mm HE, Illuminating and Smoke projectiles. Also, the Extended Range Full Bore (ERFB) 155mm projectile.
9. Naval ammunition - 3"/50 HE anti-aircraft, High Capacity Explosive for surface targets and training. The 76mm/L62 Otomelara guns (all types).
10. Artillery fuses, primers and supplementary charges

Observations

1. A majority of production (85%) is exported under supervision of the Spanish government.
2. The company demonstrates strong R&D capability as well as capability to adjust production to new ammunition products on demand.
3. EXPAL is exporting manufacturing technology by projecting, constructing, supplying, and starting up new plants on foreign soil.
4. All products meet NATO and MIL-STD specifications.
5. At present this company has valuable potential as a quality source to support Allied and augment US ammunition production if required.

6. Production Capacity:

EXPLOSIVES and PROPELLANTS:

- o propellant powders 2,160 MT per year max.
- o TNT 3,600 MT per year; 10,000 MT max.
- o RDX 900 MT per year; 3,600 MT max.

METAL PARTS for ARTILLERY SHELLS

- o 105 mm 957,000 rds. per year
- o 155 mm 633,600 rds. per year
- o 203 mm (Burgos only) 264,000 rds. per year

LOAD, ASSEMBLE and PACK (Paramo de Mesa and Vitoria)

- o 105 mm (Vitoria) 660,000 rds per year
- o 105 mm 1,650,000 rds. per year
- o 155 mm 660,000 rds. per year
- o 203 mm 396,000 rds. per year
- o Bombs 250 and 500 lbs. 42,900 bms. per year
- o Bombs (Vitoria) 33,000 bms. per year

MINES (Vitoria)

- o Anti-Tank 1,320,000 per year
- o Anti-Personnel 3,960,000 per year

TRACERS (Vitoria) 2,690,000 per year

HAND GRENADES (Vitoria) 5,280,000 per year

MORTARS - 120mm LAP Only, (Vitoria) 660,000 rds. per year

DETONATORS (all types) 19,000,000 per year

FUSES (all types) 3,960,000 per year

Santa Barbara
(Empresa Nacional Santa Barbara)

Management

Mr. Antonio Hernandez Gallardo, President; Mr. Gabriel Pena Aranda, Technical Director; Mr. Soledad Rodriguez Anton, POC.

General

Santa Barbara is owned through the government holding company INI and incorporates the production centers that belonged to the former Ministry of Army arsenals. While now integrated into the INI Defense Industries Division it is in essence the Spanish Army arsenal system. The company produces a wide range of defense products primarily for land forces. Santa Barbara consists of nine separate production locations whose beginnings go back to as early as 1540 with later additions throughout the past 400 years. The newest element is an explosives plant founded in 1955.

Santa Barbara is involved in numerous licensing, co-development and co-production programs with NATO producers. Some of the current development programs underway or planned are a new main battle tank with Giat of France, a 25 mm anti-aircraft gun with Rheinmetall of Germany and the Roland air defense system. The company is also part of an international team planning to bid on the development of NATO's Low-Cost Powered Off-boresight Dispenser.

The company also has a separate research arm, CETMA, and is developing light infantry weapons, ammunition, gun mounts and turrets, multiple rocket launchers and military electronic systems. It also has pilot plants for specialty chemical, propelling powders and explosive production. CETMA maintains its own firing ranges and proving grounds. The CETMA/Santa Barbara developed 7.62mm assault rifle is now being licensed to Germany.

Company Organization and Structure

The Santa Barbara group of companies operates on a day-to-day basis under the direction of a president and six functional directors who report to a board of directors controlled by INI. The company is part of the INI Defense Industries Division, a government holding company under the direction of the Ministry of Industry. Research, product development, production and sales are to a great part directed by the Ministry of Defense. Total sales for 1985 were \$107,403,000 (US) and exports accounted for \$40,243,000 (US) or over 37% of sales.

Santa Barbara has nine manufacturing sites spread throughout Spain with over 11,000,500 square meters of surface area and 1,750,000 square meters of covered work space. Santa Barbara has two other sites, the CETMA research facility and corporate headquarters and CETMA's test range, both of which are in the Madrid area. The production sites and activities are:

<u>SITE</u>	<u>MANUFACTURING ACTIVITY</u>
o Palencia	- ammunition, primers, fuses, and pyrotechnics
o Oviedo	- rifles, machine guns, and medium caliber rifle barrel production
o Valladolid	- LAP, explosives, nitroglycerine, nitrocellulose, and propellants
o La Coruna	- small caliber rifle barrel manufacturing and assembly
o Seville and Las Canteras	- large caliber ammunition, tanks, recoilless rifles, Teruel rocket launcher, Roland components and anti-aircraft guns
o Murcia	- propellants and LAP of charges
o Granada	- ball powder, propellants, detonators, nitrocellulose
o Toledo	- cartridges, fuses, primers, side arms, Roland and HOT missile launching components

Work Force

Santa Barbara employs 5,700 personnel. CETMA has a total of 341 personnel including 108 technical, 139 support labor and 94 administrative personnel. Production facilities employment is as follows:

o Palencia	726
o Oviedo	669
o Valladolid	500
o La Coruna	434
o Seville	573
o Murcia	350
o Granada	449
o Toledo	206

Defense Products

Santa Barbara's factories produce a full line of weapons for Spain's land forces including light infantry weapons and ammunition, anti-aircraft guns, air defense missiles, tanks, multiple rocket launchers, pyrotechnics, and energetic materials. Key products produced at the company's factories are as follows:

1. CETMA 5.62mm and 7.62mm assault rifles.
2. C-2 9mm sub-machine guns.
3. Meroka 20mm and missile air defense systems.
4. TC-3 12.7mm machine gun mounts.
5. TNT, RDX, single and multi-base propellants.
6. AMX-30 battle tanks.
7. 105mm and 155mm ammunition.
8. Teruel multiple rocket launch systems.
9. Small and medium caliber ammunition.
10. Components for Roland and Hot missile launch systems.
11. 25mm anti-aircraft guns.
12. 155mm towed howitzers.

Observations:

1. As the major supplier to Spain's land forces, Santa Barbara plays a key role in Spanish defense production. Unfortunately, due to time limitations only the CETMA facility was visited. This group of companies should be a must on any future visits to this country.
2. The company is capable of performing all critical metal fabrication and finishing operations needed to produce a wide range of weapon systems and munitions.
3. The company is currently upgrading the AMX 30 tank and capable of maintenance and overhaul of the M-48 tank and other large support vehicles and armament.
4. Santa Barbara is actively engaged in a number of joint programs with NATO producers for critical weapons systems. This provides additional and needed capability for the NATO Industrial

base. The company has licensing arrangement with almost all major NATO producers and in turn is licensing several of its own products to NATO countries.

5. The company has extensive test and evaluation facilities located at nearly every facility and produces to NATO standards and specifications. Its plants share licenses with the US, West Germany and France.

6. Santa Barbara produces many of the energetic materials it needs to manufacture its weapons systems and munitions.

7. This company provides strong potential to augment NATO and US production of weapons systems and ammunition.

Appendix A

Grupo Inisel Companies

<u>Company</u>	<u>Description</u>
INISEL	The company which leads the Group has two factories, one in Aranjuez and the other in San Fernando de Henares, and constitutes the foremost Spanish electronics company in defense and civil systems.
ENOSA	Leading Spanish company in research, manufacture and sale of optical equipment for civil and defense applications, whose activities extend into design and manufacture of public information systems and education aids.
ERIA	Services company devoted to consulting and technical assistance, software development, customer training, and systems engineering.
ERDISA	Dedicated exclusively to information services in CAD/CAM area and at the same time offering consulting on training and specific development of information programs for industrial applications.
I-CUATRO	Using its own technology, it is active in monitoring, instrumentation, and hospital data processing fields, thus making it the leading National Company in electromedicine.
ISEL	Involved in the field of systems engineering, specially orientated towards electronics and data processing applications.
PESA	Principal Spanish company in the development, manufacture, and supply of professional broadcasting equipment and systems.
TELESINCRO	Design and manufacture of business computers, peripheral terminals, screens and printers, and switching power supplies.

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